

## Executive Summary

The FY2008 Annual Report (July 2007 – June 2008) for the Maricopa County Voluntary Vehicle Repair and Retrofit (VVR&R) Program will summarize the current and historical success of the program. The VVR&R program continues to achieve its goal of reducing vehicle emissions in a cost-effective manner. The program offers the citizens of Maricopa County the opportunity to voluntarily repair and, when possible, retrofit their high-emitting older vehicles with newer technology.

### Summary of Results

	FY2008 1 <sup>st</sup> Qtr	FY2008 2 <sup>nd</sup> Qtr	FY2008 3 <sup>rd</sup> Qtr	FY2008 4 <sup>th</sup> Qtr	FY2008 Total	FY2007 Total
Average Amount Spent by Customers & Maricopa County Per Vehicle Repaired	\$772	\$776	\$735	\$757	\$761	\$754
Average Amount Spent by Maricopa County Per Vehicle Repaired	\$514	\$513	\$494	\$507	\$507	\$511
Number of Vehicles Repaired	322	239	261	260	1,082	1,030
Number of Diesel Vehicles Repaired - GVW 8,500+ lbs.	0	0	1	0	1	0
Number of Vehicles Repaired - Retrofit Kits	4	0	4	0	8	15
Amount Spent by Customers & Maricopa County for Vehicles Repaired	\$247,021	\$185,459	\$193,022	\$194,550	\$820,052	\$773,352
Amount Spent by Maricopa County for Vehicles Repaired	\$164,868	\$121,963	\$129,169	\$129,755	\$545,754	\$522,260
Amount Spent by Maricopa County for Diesel Vehicles Repaired - GVW 8,500+ lbs.	\$0	\$0	\$229	\$0	\$229	\$0
Administrative Costs	\$51,898	\$17,068	\$30,569	\$26,426	\$126,426	\$104,287

### Emissions Reductions

#### Basic Idle & Loaded Testing

Emissions reduction calculations vary depending on the type of test used. Older vehicles (1967 – 1980) and some newer trucks use the basic idle and loaded methods for emissions testing. Because of how the hydrocarbons and carbon monoxide are measured, there is no formula available to determine cost effectiveness with these vehicles. The following grid will illustrate the average percent reduction for each pollutant:

	Idle Test		Loaded Test	
	HC	CO	HC	CO
1 <sup>st</sup> Quarter FY2008	50%	64%	54%	98%
2 <sup>nd</sup> Quarter FY2008	65%	66%	55%	69%
3 <sup>rd</sup> Quarter FY2008	68%	80%	66%	85%
4 <sup>th</sup> Quarter FY2008	68%	52%	74%	53%
FY2008 Total	63%	64%	63%	95%
FY2007 Total	73%	71%	64%	80%

## Emissions Reductions

### I/M Testing

More modern vehicles (1981-1995) calculate emissions using the I/M Test. The grid below shows the average percent reduction in pollutants:

	HC	CO	NOx
1 <sup>st</sup> Quarter FY2008	75%	82%	52%
2 <sup>nd</sup> Quarter FY2008	76%	84%	54%
3 <sup>rd</sup> Quarter FY2008	73%	83%	56%
4 <sup>th</sup> Quarter FY2008	70%	81%	52%
FY2008– Total	74%	82%	53%
FY2007– Total	73%	83%	51%

Because the I/M Test measures each pollutant in grams per mile, a cost effectiveness formula can be applied, accounting for tons reduced and the average miles driven:

	FY2008 1 <sup>st</sup> Qtr	FY2008 2 <sup>nd</sup> Qtr	FY2008 3 <sup>rd</sup> Qtr	FY2008 4 <sup>th</sup> Qtr	FY2008 Total	FY2007 Total
Metric Tons Reduced	90.16	66.83	55.25	57.35	269.58	276.05
Regular Tons Reduced	99.38	73.67	60.90	63.22	297.16	304.29
Maricopa County Cost Per Metric Ton	\$857	\$871	\$1,010	\$960	\$914	\$873
Maricopa County Cost Per Regular Ton	\$778	\$790	\$916	\$871	\$829	\$792
Customer & Maricopa County Cost Per Metric Ton	\$1,289	\$1,319	\$1,503	\$1,431	\$1,371	\$1,288
Customer & Maricopa County Cost Per Regular Ton	\$1,170	\$1,196	\$1,364	\$1,299	\$1,243	\$1,169

Costs are annualized over two years and assume that the VVR&R Program's emission savings benefits will be realized over at least that length of time. By comparison, emission reduction efforts of similar pollutants at stationary sources within Maricopa County can cost far more. Using current cost effectiveness values for reasonably available control technology (RACT), emission reduction costs range from \$5,000 to \$8,000 per ton for like-type pollutants. This demonstrates that the VVR&R Program is an especially cost effective way of reducing emissions from the largest source of emissions in Maricopa County.

## **Emissions Reductions**

### **OBD-II Testing**

All newer vehicles (1996+) are I/M tested using an OBD-II (On-Board Diagnostic, Generation II) testing method. OBD and traditional tailpipe testing offer different approaches in identifying vehicles in need of emission related repairs. OBD-II testing does not measure pollutants such as hydrocarbons, carbon monoxide and oxides of nitrogen. Instead, a failing emissions test will be comprised of varying Diagnostic Trouble Codes (DTC's). With OBD-II testing, data is efficiently collected by connecting a generic scan tool to a Data Link Connector (DLC) located under the instrument panel.

OBD-II systems use an Engine Control Module (ECM) to continuously monitor the emissions control system in addition to other major engine components for proper operation. This technology makes it possible to diagnose failing or malfunctioning emission control devices for repair or replacement before high emissions occur. Effectively, an I/M testing station is programmed into each OBD-II vehicle.

All related OBD-II technology standards including the data, the scan tool, the diagnostic test modes and the DTC's are established by the Society of Automobile Engineers.

## **Emissions Reductions**

### **Diesel Program**

In 2001, the County established a diesel repair program as mandated ARS §49-474.03. Qualifying diesel powered motor vehicles registered in Area A or B with a gross vehicle weight of more than 8,500 pounds that fail any random roadside vehicle test conducted by the state or that fail a required emissions test are eligible for up to \$1,000 in repair or retrofit costs from the program. Qualified vehicle owners will be responsible for one-half of the costs of the qualified repair and the other half of the costs may be funded by the program up to \$1,000.

## **Customer Satisfaction**

Customers are provided a self-addressed stamped survey postcard after their vehicle is repaired. Using the following scale, customers are asked to rank how well the program requirements were explained to them, as well as, to rank their satisfaction with the repair process and the service received by their participating garage.

1. Extremely Disagree
2. Disagree
3. No Opinion/Okay
4. Agree
5. Extremely Agree

Of the 1,082 vehicles repaired during FY08, 369 customers returned their surveys resulting in a 34% response rate. The following chart reflects the collective, average response rates from all surveys received during this period:

<b>Question</b>	<b>FY08 Average Scores</b>
When I called, the program was thoroughly explained.	4.59
My experience with the repair facility was satisfactory.	4.67
I am satisfied with the repairs made to my vehicle.	4.62

## Vehicle Repair Summary

The number of vehicles repaired, the number of retrofit kits installed and the number of diesel vehicles repaired are detailed in the grid below for FY2008 (July 2007 – June 2008) and for the current, cumulative Program (July 2000 – June 2008).

Model Year	Number of Vehicles Repaired		Number of Retrofit Kits Installed		Number of Diesel Vehicles Repaired (gvw 8,500+ lbs)	
	FY2008	Cumulative Program	FY2008	Cumulative Program	FY2008	Cumulative Program
1967	0	27	0	0	0	0
1968	1	25	0	0	0	0
1969	3	34	0	0	0	0
1970	2	20	0	0	0	0
1971	4	27	0	0	0	0
1972	4	47	0	0	0	0
1973	4	39	0	0	0	0
1974	2	34	0	0	0	0
1975	3	32	2	18	0	0
1976	2	56	1	22	0	0
1977	4	59	1	28	0	0
1978	3	84	0	49	0	1
1979	4	98	2	67	0	0
1980	3	68	2	39	0	0
1981	6	151	0	2	0	0
1982	9	171	0	0	0	0
1983	9	247	0	1	0	0
1984	25	348	0	2	0	0
1985	39	526	0	0	0	0
1986	42	766	0	0	0	0
1987	55	781	0	1	0	0
1988	56	730	0	1	0	0
1989	71	715	0	2	0	0
1990	71	676	0	0	1	1
1991	87	533	0	0	0	0
1992	105	449	0	0	0	0
1993	132	425	0	0	0	0
1994	168	329	0	0	0	0
1995	122	181	0	0	0	0
1996	46	46	0	0	0	0
<b>Total</b>	<b>1,082</b>	<b>7,724</b>	<b>8</b>	<b>232</b>	<b>1</b>	<b>2</b>

## Repeat Customers

In February 2004, the VVR&R Program Advisory Committee determined that since the intent of the program is to reduce tailpipe emissions on as many vehicles as possible, eligibility was extended to include the same owner, entering the same vehicle, through the program more than once. Below, the number of Repeat Customers is broken down by quarter for FY2008.

	1 <sup>st</sup> QTR	2 <sup>nd</sup> QTR	3 <sup>rd</sup> QTR	4 <sup>th</sup> QTR
Number of Repeat Customers	25	11	13	20

## Program Summary

	Dates	Number of Vehicles Repaired	Number of Retrofit Kits Installed	Metric Tons/Year Reduced	Cost Per Metric Ton	Cost Per Regular Ton
Pilot	1/99 – 6/00	1,662	37	425	\$591	\$536
Current Program	7/00 –06/08	7,724	232	1,982	\$505	\$796

## Funding History

Year	Amount	Source
Pilot	\$640,000	SB1427
FY01	\$1,920,000	SB1504
FY01	\$92,800	ADEQ's Catalytic Converter Replacement Program
FY02	\$320,000	HB2538
FY03	-0-	HB2538 Allocation removed during Special Legislative Session
FY04	\$399,534	ADEQ Contract 99-0089, Amendment No. 7
FY05	\$725,000	ADEQ Contract EV05-0013
FY06	\$725,000	ADEQ Contract EV06-0008
FY07	\$725,000	ADEQ Contract EV06-0008, Amendment No. 1
FY08	\$725,000	ADEQ Contract EV06-0008, Amendment No. 2

## Program Parameters

In order to qualify for the program, vehicles must meet the following criteria established by ARS § 49-474.03 and the VVR&R Program's Advisory Committee:

- ⇒ The owner must be willing to participate and the vehicle must be functionally operational
- ⇒ The vehicle must be titled in Arizona
- ⇒ The vehicle must have been registered during the immediately preceding 12 months. It cannot have been unregistered for more than 60 days
- ⇒ The vehicle must have failed a required emissions test in the "Emissions Inspection Results" within the past 60 days; failures in the "Equipment" or "Pressure & Purge Inspection Results" are not eligible
- ⇒ The emissions control system has not been tampered with, removed, or disabled
- ⇒ Work must be done at a participating garage
- ⇒ One vehicle per owner
- ⇒ Motor homes, motorcycles, salvage vehicles and fleet vehicles are not eligible
- ⇒ If the vehicle is eligible for a retrofit kit (most 1975-1980 vehicles and some newer model year trucks), one must be installed
- ⇒ There are no reimbursements available for work already done
- ⇒ Some vehicles may not be eligible for assistance if they are in extremely poor condition

## **Process**

The primary method of communication regarding this program is located on various pamphlets people receive as they proceed through the registration and emissions testing process. Information on the program is included on the pamphlet entitled "Car Care – Important Emissions Testing Information" which is sent to all owners due to re-register their vehicles.

If they fail the emissions test, customers receive a pamphlet from the emissions station entitled "Car Care – Failed Vehicle Information." In addition, banners have been installed at each of Maricopa County's thirteen testing stations. Customers may call the VVR&R helpline or go directly to the Maricopa County Air Quality Department website to locate an authorized repair facility.

When customers take their vehicle to the repair facility, they bring their title, current proof of registration, and the emissions failure notice. Customers sign an agreement sheet and a vehicle diagnostic is performed. The customers are informed about necessary repairs and associated costs. If customers continue in the program, they pay the first \$150 to the repair facility. Maricopa County Air Quality Department pays, up to, an additional \$550 for repairs to address the specific emission failure or, up to, an additional \$650 for repair and retrofit kit installation. If the cost to bring the vehicle to emission standards exceeds these amounts, owners may opt to pay the additional expense or withdraw their vehicle from the program. If they choose to withdraw from the program, they are charged a \$50 diagnostic fee.

Repairs generally take a day, after which the mechanic takes the vehicle to an emission station to obtain a pass notice. The facility forwards all paperwork (customer agreement, invoices with balances noted, and copies of title, registration, failure and pass notices) to Kachina Automotive. Kachina Automotive then submits copies of this information, along with a final invoice, to Maricopa County. Maricopa County pays Kachina Automotive who then distributes payment to each repair facility.

## **Checks & Balances**

A system of checks and balances has been established, with the help of the State of Arizona Waiver Facilities, to ensure repairs are properly completed as indicated on the invoices and money is spent appropriately. Each customer is given a self-addressed stamped postcard with survey questions on the process and the service. This allows the program to gather immediate feedback. If customers call with complaints, they may be referred to a waiver station. There, technicians compare the invoiced repairs with what was actually done to the vehicles and test the vehicles to be sure they are passing the emissions test. Most vehicles receive positive reports from the waiver stations, but those that do not are referred back to the garages for further evaluation and repair. From the program inception to date, all vehicles have been repaired to everyone's satisfaction.

**Retrofit Kits**

The retrofit kits utilized in this program are supplied by Neutronics Enterprises, Inc. The kit converts vehicles originally built with open loop carburetor or fuel injection systems and oxidation catalysts into closed-loop (feedback) systems with three-way catalysts. The exclusive Neutronics representative in Maricopa County is Kachina Automotive Equipment, Inc. Kachina, as an authorized vendor for Maricopa County, is responsible for maintaining an inventory of the retrofit kits. In addition, Maricopa County subcontracts with Kachina to oversee all aspects of selecting and training of the repair facilities. The VVR&R Program currently has seven authorized repair facilities in the Valley. Currently, facilities are located in Avondale, Mesa, Higley, Tempe, North Phoenix, North-East Phoenix, and Central-West Phoenix.

**Advisory Committee**

The Advisory Committee, established under ARS § 49-588.34, meets as needed to advise and make recommendations on the development and implementation of the VVR&R Program. Members include representatives from the Arizona Department of Transportation, the Arizona Department of Environmental Quality, automobile hobbyists, and the automotive aftermarket products industry.